LXIII.—*Natural History Notes from the R.I.M.S. Ship 'Investigator,' Capt. T. H. Heming, R.N., commanding.*—Series III., No. 15. *Second Preliminary Report on the Deep-sea Alcyonaria collected in the Indian Ocean.* By Prof. J. Arthur Thomson, M.A., and W. D. Henderson, M.A., B.Sc., Carnegie Research Fellow, University of Aberdeen.

In the Ann. & Mag. Nat. Hist. vol. xv. 1905, pp. 547–557, we published a preliminary report on a collection of deep-sea Alcyonarians from the Indian Ocean, entrusted to us for examination by the Trustees of the Indian Museum through Prof. A. Alcock, LL.D., F.R.S. As we have completed our survey, we wish, pending the publication of the memoir, to sum up the general results and to make a few corrections in our first preliminary report.

The collection includes 86 species, of which 61 seem to be new. Descriptions of the new forms are given in the memoir about to be published. The distribution of the new forms is as follows:—6 Stolonifera, 8 Alcyonacea, 3 Pseudaxonia, 22 Axifera, and 22 Stelechotokea. It has been found necessary to establish five new genera—*Stereacanthia* and *Agaricoides* (the latter established by Mr. J. J. Simpson, Zool. Anzeig. xxix. 1905, pp. 263–271, 19 figs.), both in the family Nephthyidæ, subfamily Siphonogorginæ; *Acanthomuricea* and *Calicogorgia* in the family Muriceidæ; and *Thesioides* in the family Kophobelemnonidæ. We submit brief notes on these five new types.

New Types.

The genus *Stereacanthia*, from the Andamans, is a Siphonogorgid in the vicinity of *Lemnalia*. A bare, densely spiculose trunk, made up of large longitudinal canals, with thin spiculose walls, bears a branched polyparium with the polyps disposed singly or in small crowded bundles; the aboral bands of spicules on the infolded tentacles form a simple pseudo-operculum; the spicules are warty spindles or golf-club forms, and there are no quadriradiate double-stars as in *Lemnalia*.

The genus *Agaricoides*, from 6° 31′ N., 79° 33′ 45″ E., is a remarkable Siphonogorgid, perhaps distinctly related to *Lemnalia* (Gray, emend. Bourne), but quite unlike any other type known to us. It is unbranched, mushroom-like, with complex octagonal verrucæ, pedicelled anthocodiæ, intro-

versible zooids, a tentacular operculum, echinate spindles and hockey-club forms, and many peculiarities of structure.

The genus *Acanthomuricea*, represented by *A. ramosa* from 7° 55′ N., 81° 47′ E., 506 fathoms, and *A. spicata* from 6° 31′ N., 79° 38′ 45″ E., 401 fathoms, is a Muriceid, perhaps related to *Placogorgia* (Wright & Studer). The two species are upright colonies, irregularly branched in one plane, with thin bark-like cœnenchyma of rough imbricating scales, with prominent verrucæ on all sides, with conical tentacular opercula, and with very heterogeneous spiculation.

The genus *Calicogorgia*, represented by *C. investigatoris* from 11° 14′ 30″ N., 74° 57′ 15″ E., 68–148 fathoms, and *C. rubrotincta* from the Bay of Bengal, 88 fathoms, is a Muriceid, probably related to Verrill's somewhat vaguely defined *Anthogorgia*. The colonies are irregularly branched in one plane, the verrucæ are prominent with spicules in eight bands, with a conical operculum consisting of a crown and points, with warty spindles straight or curved.

The genus *Thesioides*, from 18° 0′ 15″ N., 93° 30′ 45″ E., 448 fathoms, and 16° 25′ N., 93° 43′ 30″ E., 463 fathoms, is a Kophobelemnonid, near *Bathyptilum*, with a greatly elongated slender rachis borne by a short stalk without pinnules, with long slender autozooids without calyces and without any spicules.

List of Species.

Order I. STOLONIFERA, Hickson.

Family **Cornulariidæ**.

Sympodium indicum, sp. n.
—— decipiens, sp. n.
—— incrustans, sp. n.
Sympodium granulosum, sp. n.
—— tenue, sp. n.
—— pulchrum, sp. n.

Order II. ALCYONACEA, Verrill (pro parte).

Family **Alcyonidæ**.

Sarcophytum aberrans, sp. n.
Sarcophytum agaricoides, sp. n.

Family **Nephthyidæ**.

Subfamily SPONGODINÆ.

Spongodes uliginosa, sp. n.
—— Alcocki, sp. n.
Lithophytum indicum, sp. n.

Subfamily SIPHONOGORGINÆ.

Chironephthya variabilis, *Hickson*.
—— macrospiculata, sp. n.
Stereacanthia indica, gen. et sp. n.
Agaricoides Alcocki, *Simpson*, gen. et sp. n.

Order III. PSEUDAXONIA, G. von Koch.

Family **Briareidæ**.

Subfamily Briareinæ.

Paragorgia splendens, sp. n.

Family **Sclerogorgidæ**.

Suberogorgia Köllikeri, *Wright & Studer*, var. ceylonensis, *Thomson*.
Keroëides Koreni, *Wright & Studer*.
—— gracilis, *Whitelegge*.

Family **Melitodidæ**.

Parisis indica, sp. n.

Family **Corallidæ**.

Pleurocorallium variabile, sp. n.

Order IV. AXIFERA, G. von Koch.

Family **Dasygorgidæ**.

Lepidogorgia Verrilli, *Wright & Studer*.
Chrysogorgia orientalis, *Versluys*.
—— flexilis, *Wright & Studer*.
Chrysogorgia dichotoma, sp. n.
—— irregularis, sp. n.
—— indica, sp. n.

Family **Isidæ**.

Subfamily Ceratoisidinæ.

Ceratoisis gracilis, sp. n.
Acanella rigida, *Wright & Studer*.
Acanella robusta, sp. n.

Family **Primnoidæ**.

Subfamily Primnoinæ.

Stachyodes Allmani (*Wright & Studer*) = Calypterinus Allmani, *Wright & Studer*.
Stenella horrida, sp. n.
Thouarella Moseleyi, *Wright & Studer*, var. spicata, n.
Caligorgia flabellum, *Ehrenberg*.
—— indica, sp. n.
—— dubia, sp. n.

Family **Muriceidæ**.

Acanthogorgia aspera, *Pourtales* (=? A. spinosa, *Hiles*).
Paramuricea indica, sp. n.
Acanthomuricea ramosa, gen. et sp. n.
—— spicata, sp. n.
Anthogorgia Verrilli, sp. n.
Calicogorgia investigatoris, gen. et sp. n.
—— rubrotincta, sp. n.
Placogorgia indica, sp. n.
—— orientalis, sp. n.
Astrogorgia rubra, sp. n.
Acamptogorgia bebrycoides, *von Koch*.
—— ——, var. robusta, n.
—— circium, sp. n.
Acis spinosa, sp. n.
Muricella bengalensis, sp. n.

Family **Gorgonidæ**.

Callistephanus Koreni, *Wright & Studer*.

Family **Gorgonellidæ**.

Nicella flabellata (*Whitelegge*) (=Verrucella flabellata, *Whitelegge*).
Juncella elongata, *Pallas*.
Juncella miniacea, sp. n.
Scirpearella moniliforme, *Wright & Studer*.
—— alba, sp. n.

Order V. STELECHOTOKEA, Bourne.

Section ASIPHONACEA.

Family **Telestidæ**.

Telesto Arthuri, *Hickson & Hiles*.
Telesto rubra, *Hickson*.

Section PENNATULACEA.

Family **Protocaulidæ**.

Protocaulon indicum, sp. n.

Family **Protoptilidæ**.

Protoptilum medium, sp. n.
Distichoptilum gracile, *Verrill*.

Family **Kophobelemnonidæ**.

Kophobelemnon Burgeri, *Herklots*, var. indica, n.
Sclerobelemnon Köllikeri, sp. n.
Bathyptilum indicum, sp. n.
Thesioides inermis, gen. et sp. n.

Family **Umbellulidæ**.

Umbellula durissima, *Kölliker*.
—— dura, sp. n.
—— intermedia, sp. n.
—— rosea, sp. n.
—— purpurea, sp. n.
—— elongata, sp. n.
Umbellula Köllikeri, sp. n.
—— radiata, sp. n.
—— pendula, sp. n.
—— indica, sp. n.
—— sp.

Family **Anthoptilidæ**.

Anthoptilum Murrayi, *Kölliker*.
Anthoptilum decipiens, sp. n.

Family **Funiculinidæ**.

Subfamily FUNICULININÆ.

Funiculina quadrangularis (*Pallas*)=Leptoptilum gracile, *Kölliker*.
—— gracilis, sp. n.

Subfamily STACHYPTILIDÆ.

Stachyptilum maculatum, sp. n.

Family **Virgularidæ**.

Pavonaria Willemoësii (*Kolliker*)=Microptilum Willemoesii, *Kolliker*.

Family **Pennatulidæ.**

Subfamily Pennatulinæ.

Pennatula indica, sp. n.
—— veneris, sp. n.
Pennatula splendens, sp. n.
—— pendula, sp. n.

Subfamily Pteroëidinæ.

Pteroëides triradiata, sp. n.

We regret to have to make the following corrections—some of which are merely verbal, while others indicate unfortunate mistakes—in our provisional list of species : —

For *Sympodium incrustans*, sp. n., read *Sympodium decipiens*, sp. n.
For *Clavularia decipiens*, sp. n., read *Sympodium incrustans*, sp. n.
For *Sarcophytum parvum*, sp. n., read *Sarcophytum aberrans*, sp. n.
For *Sarcophytum fungiforme*, sp. n., read *Sarcophytum agaricoides*, sp. n.
For *Spongodes rosea*, Kükenthal, read *Sponjo tes Alcocki*, sp. n.
For *Spongodes rakayæ*, Hickson & Hiles, read *Spo ıgodes ahyinosa*, sp. n.
For *Dasygorgia ramosa*, sp. n. } read *Chrysogorgia irregularis*, sp. n.
For *Dasygorgia aurea*, sp. n. }
For *Strophogorgia Verrilli*, W. & S., read *Lepidogorgia Verrilli*, W. & S.
For *Herophila gracilis*, sp. n., read *Chrysogorgia flexilis*, W. & S.
For *Ceratoisis palmæ*, W. & S., read *Ceratoisis gracilis*, sp. n.
Delete *Primnoisis alba*, sp. n.—a misinterpretation.
For *Primnoa Ellisii*, von Koch, read *Caligorgia indica*, sp. n.
For *Juncoptilum Alcocki*, gen. et sp. n., read *Distichoptilum gracile*, Verrill.
For *Stachyptilum fuscum*, sp. n., read *Stachyptilum maculatum*, sp. n.
For *Pennatula Murrayi* read *Pennatula pendula*, sp. n.

It is very difficult to decide what is the best course to pursue in dealing with genera like *Sympodium* and *Umbellula*. It is not easy to give distinctive diagnoses of the new species we have felt compelled to establish, and yet the *tout ensemble* of the characters of each results in a quite characteristic appearance. References to *Sympodium* sp., *Sympodium* sp. (?), *Sympodium* sp. α, and the like are tedious and confusing. It is probable that the investigation of a large number of representatives (which this collection did not include) will show that the differences between some of our species are variational or modificational. The same remarks apply, though not so obviously, to *Acanthogorgia*, *Acamptogorgia*, *Muricella*, *Acis*, and *Pennatula*.

Viviparity.

In 1900 Prof. S. J. Hickson reported his discovery of embryos *in situ* in *Gorgonia capensis*—the first case of viviparity that he had observed in his wide and prolonged study of Alcyonarians.

He pointed out, however, that viviparity had been previously reported in *Corallium rubrum* by Lacaze-Duthiers, in "Clavulaires pétricoles" and in *Sympodium* (*Alcyonium*) *coralloides* by Marion & Kowalevsky, in three species of *Nephthya* (found at depths of 269–761 fathoms) by Koren & Danielssen.

In Prof. W. A. Herdman's collection from Ceylon we found embryos *in sitû* in *Gorgonia capensis* as Hickson had stated. Corroborating Marion & Kowalevsky, we found embryos in *Clavularia pregnans* (Th. & H.) and *C. parvula* (Th. & H.) collected by Mr. Cyril Crossland from Zanzibar and Cape Verde Islands respectively.

In the present collection we found embryos—blastulæ, gastrulæ, and slightly more advanced stages—in eight species :—*Sarcophytum aberrans*, sp. n., *Chrysogorgia flexilis*, W. & S., *Ceratoisis gracilis*, sp. n., *Paramuricea indica*, sp. n., *Distichoptilum gracile*, Verrill, *Umbellula elongata*, sp. n., *Funiculina gracilis*, sp. n., and *Pennatula indica*, sp. n. ; meanwhile Mr. James J. Simpson, M.A., B.Sc., has also found embryos in specimens of *Isis hippuris* included in the littoral collection from the Indian Ocean (see Journ. Linn. Soc., Zool. xxix. p. 431, 1906).

We have also found embryos in a species of *Sclerophytum* from the Red Sea and in the British *Primnoa reseda*.

It is therefore clear that viviparity is by no means uncommon in Alcyonarians, and it will be interesting to discover if it is particularly characteristic of deep-sea species.

Some particular Facts of interest in the Collection.

One specimen of *Sarcophytum aberrans*, sp. n., is supported by a siliceous axis like a thick knitting-needle, 300 mm. in length by 2·3 mm. in breadth, probably the spicule of *Monorhaphis* or some allied sponge.

Analogous on a smaller scale is the siliceous sponge-spicule which forms the support of *Sympodium incrustans*, sp. n.

The spicules of *Chironephthya macrospiculata*, sp. n., sometimes attain the unusual length of 8·3 mm., and some of those of *Spongodes uliginosa*, sp. n., are almost equally huge (8 mm.).

Noteworthy is the great heterogeneity of the spicules in some of the forms, *e. g.* plates, disks, triangles, rods, spindles, and "golf-clubs" in *Acanthomuricea spicata*, sp. n.

Besides the very peculiar habit—incrusting a huge siliceous rod—there are many interesting features in *Sarcophytum*

aberrans, sp. n., *e. g.* the occurrence of several sizes of autozooids, the inturning of almost the whole of a large tentacle into the stomodæum, and the presence of ova and embryos in the siphonozooid canals.

The dimorphism which Gray recorded in his *Paragorgia nodosa* is confirmed in *P. splendens*, sp. n.

The complex differentiation of the polyps in *Agaricoides Alcocki*, Simpson, is quite unique. The presence of numerous Foraminifera in the stomodæum is also interesting.

Among other peculiarities we may mention the very remarkable tentacles of *Thesioides inermis*, gen. et sp. n., the remarkable base of *Anthoptilum decipiens*, sp. n., the small number of rays (3) in the pinnules of *Pteroëides triradiata*.

In regard to a collection which is a very feast of colour, we may call special attention to the exquisite colour-schemes of *Pennatula veneris*, *P. pendula*, *P. splendens*, and *P. indica*.

Some of the epizoic animals are interesting, *e. g.* the peculiar Solenogaster (*Rhopalomenia gorgonophila?*) on *Acamptogorgia circium*, sp. n.

LXIV.—*On the Land Molluscan Subgenus* Cœlorus, *Pilsbry*.

By G. K. Gude, F.Z.S.

Recently Messrs. Sowerby and Fulton submitted to me for examination some shells they had received from Mr. Y. Hirase, of Kyoto. They were labelled *Eulota* (*Cœlorus*) *caviconus*, and at first I was inclined to regard them as an undescribed form, as upon comparison with that species they presented several striking differences, having a more elevated and convex spire, a smaller diameter, a more contracted umbilicus, and a more laterally contracted aperture. Upon receiving further material, however, several intermediate forms were found, and the species, therefore, presents a considerable amount of variation.

The subgenus *Cœlorus*, which, so far as our present knowledge enables us to judge, appears to be restricted to Japan, was established for the reception of the then only known species—*Eulota cavicollis*—by Prof. Pilsbry (Proc. Acad. Nat. Sc. Philad. 1899, p. 528). The group has not yet been investigated anatomically; it will, in all probability, prove to be most nearly allied to *Plectotropis*, to which group, in fact, the first species was originally assigned by the writer. The presence in the two species, subsequently discovered, of